Chap 1: Review of functions

Domain
Range
$f(x)$

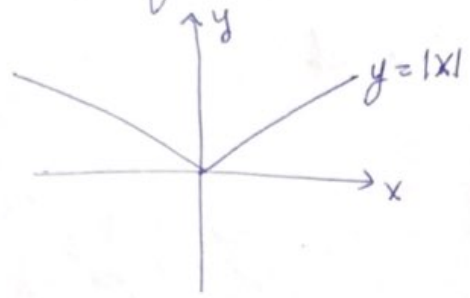
} A function f is a Rule That assigns to each point x in The Domain a unique point "image" y $f(x)$ in the Range R

VL test : To Know weither The diagram is a function or not-

How to Know even or odd?

Known functions

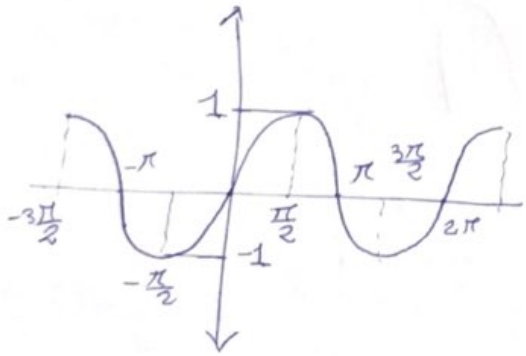
Absolute Value



$D = (-\infty, \infty)$
$R = [0, \infty)$
even

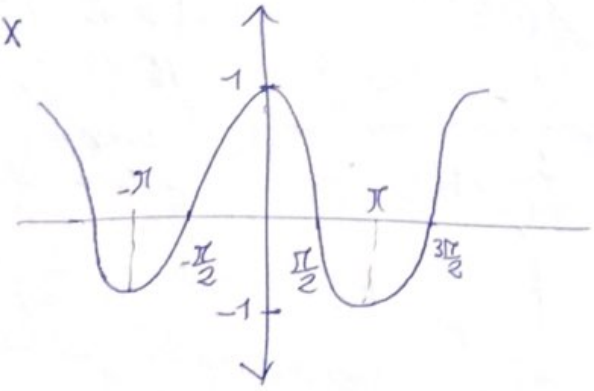
Trigonometric functions

$y = \sin x$



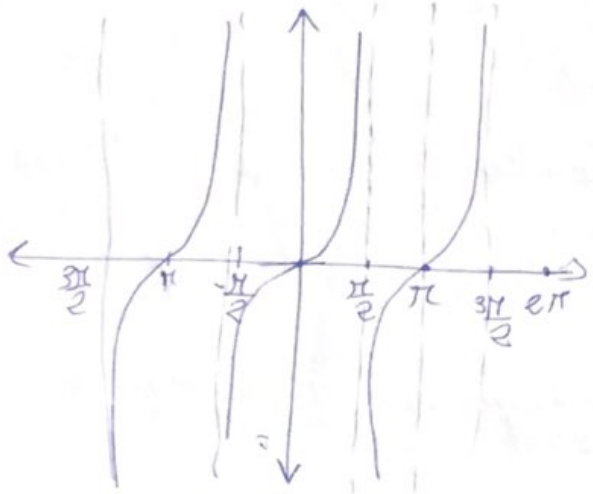
$D = (-\infty, \infty) = \mathbb{R}$
$R = [-1, 1]$
odd $\sin(-x) = -\sin(x)$
Period 2π

$y = \cos x$



$D = \mathbb{R}$
Range : $[-1, 1]$
even $\cos(-x) = \cos(x)$
Period 2π

$y = \tan X = \frac{\sin X}{\cos X}$



$n = 0, \pm 1, \ldots$

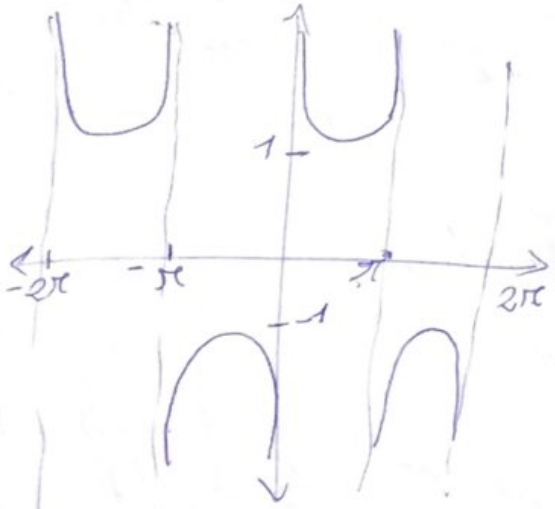
$D = (-\infty, \infty) \setminus \{\frac{\pi}{2} + n\pi\}$

Rang $= (-\infty, \infty)$

odd

period π

$y = \csc x = \frac{1}{\sin X}$ co-secant



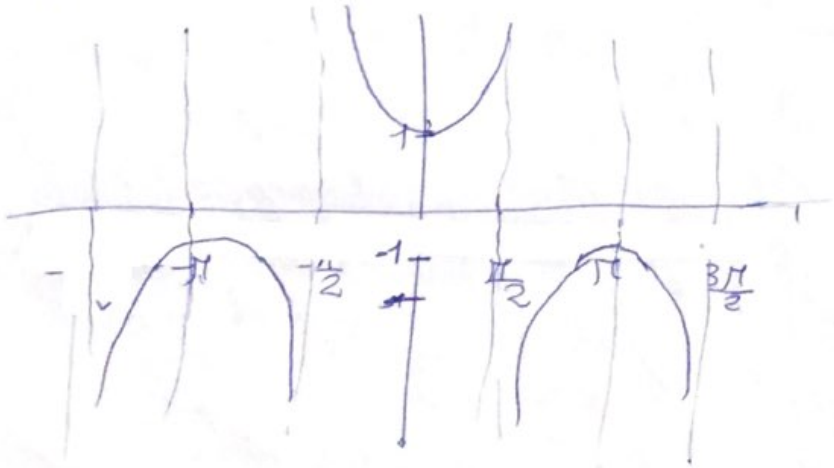
$D = \mathbb{R} \setminus \{\pm\pi, \pm 2\pi, \ldots\}$

$R = (-\infty, -1] \cup [1, \infty)$

odd

period 2π

$y = \sec x = \frac{1}{\cos X}$ secant



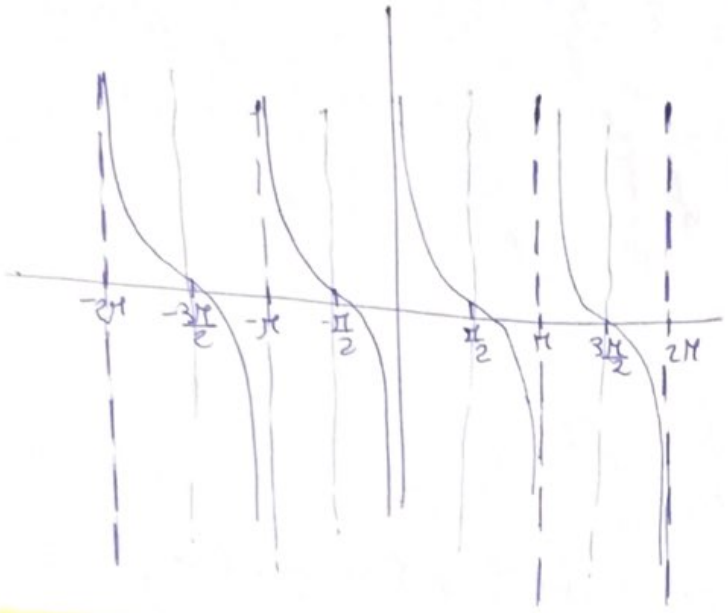
$D = \mathbb{R} \setminus \{\pm\frac{\pi}{2}, \pm\frac{3\pi}{2}, \ldots\}$

$R = (-\infty, -1] \cup [1, \infty)$

even

period 2π

$$y = \cot x = \frac{\cos x}{\sin x}$$



$D = \mathbb{R} \setminus \{n\pi + n2\pi\}$, $n = 0, \pm 1, \ldots$

$R = \mathbb{R}$

Trigonometric Identities

1- $\sin^2(x) + \cos^2 x = 1$

2- $\sin 2x = 2 \sin x \cos x$

3- $\cos 2x = \cos^2 x - \sin^2 x$
$= 1 - \sin^2 x$
$= 2\cos^2 x - 1$

4- $1 + \cot^2 x = \csc^2 x = \frac{1}{\sin^2 x}$

5- $\tan^2 x + 1 = \sec^2 x = \frac{1}{\cos^2 x}$

6- $\sin(A+B) = \sin A \cos B + \sin B \cos A$

7- $\cos(A+B) = \cos A \cos B - \sin A \sin B$

* $\sin x$, $\csc x$, $\tan x$, $\cot x$ → odd
* $\cos x$, $\sec x$ → even

$\tan, \cot x$ → period π → $\tan(x+\pi) = \tan x$, $\cot(x+\pi) = \cot x$

$\sin x, \cos x, \csc x, \sec x$ → period 2π → $\sin(x+2\pi) = \sin x$, $\csc(x+2\pi) = \csc x$, $\cos(x+2\pi) = \cos x$, $\sec(x+2\pi) = \sec x$

* $\sin(x + \frac{\pi}{2}) = \cos x$ (إزاحة للمثال)
* $\cos(x + \frac{\pi}{2}) = -\sin x$

Composite "o"

$$(f \circ g) = f(g(x))$$

$$(f \circ g)(x) \neq (g \circ f)(x)$$